PENDING CLAIMS AS AMENDED

Please amend the claims as follows:

1. (Currently Amended) A remote station apparatus comprising:

a multi-element antenna configured to receive signals from at least one transmitter and to output highly correlated signals from the respective transmitter; [[and]]

a controller configured to receive the highly correlated signals, to determine a spatial signature, including amplitude, angle of arrival and phase for each signal, to estimate a complex covariance matrix and to combine the correlated signals to reproduce the signal transmitted from a selected one of the at least one transmitter; and

wherein the controller further comprises a weighting factor engine configured to determine a set of weighting factors for each of the at least one transmitter signals in response to the spatial signatures of the received signals and said complex covariance matrix, whereby said weighting factors may be determined in accordance with the following equation:

$w = ((R-Rs)^{-1})c$, where w is the weighting factor, c is an estimate of said complex spatial signature, R is said complex covariance matrix, and Rs is the matrix formed by taking the out-product of said c with c-hermitian conjugate.

2. (Original) A remote station as defined in Claim 1, wherein the multi-element antenna is a dual element antenna.

3. (Original) A remote station as defined in Claim 1, wherein the multi-element antenna has an envelope correlation of greater than about 0.7.

4. (Original) A remote station as defined in Claim 1, wherein the controller determines a spatial signature of each signal received from the at least one transmitter.

5. (Canceled)

6. (Original) A remote station as defined in Claim 1, wherein the controller further comprises a combiner configured to combine the received signals using the weighting factors to reproduce the signal from a selected one of the at least one transmitter.

7. (Previously Presented) A remote station as defined in Claim 6, wherein the received signals are combined using an optimal combiner, wherein a signal to interference ratio is optimized.

8. (Previously Presented) A remote station as defined in Claim 6, wherein the received signals are combined using a maximal combiner, wherein a signal to interference ratio is maximized.

9. (Original) A remote station as defined in Claim 1, wherein the received signals are CDMA signals.

10. (Currently Amended) A remote station apparatus comprising:

a multi-element antenna configured to receive signals from at least one transmitter and to output highly correlated signals from the respective transmitter; [[and]]

a controller configured to receive the highly correlated signals from the multi-element antenna to determine a spatial signature, including amplitude, angle of arrival and phase for each signal, to estimate a complex covariance matrix and to combine the correlated signals to maximize the ratio of a preferred signal amplitude to the signal amplitude of the other received signals; and

wherein the controller further comprises a weighting factor engine configured to determine a set of weighting factors for each of the at least one transmitter signals in response to the spatial signatures of the received signals and said complex covariance matrix, whereby said weighting factors may be determined in accordance with the following equation:

$w = ((R\text{-}Rs)^{-1})c$, where w is the weighting factor, c is an estimate of said complex spatial signature, R is said complex covariance matrix, and Rs is the matrix formed by taking the out-product of said c with c-hermitian conjugate.

11. (Original) A remote station as defined in Claim 10, wherein the multi-element antenna has an envelope correlation of greater than about 0.7.

12. (Original) A remote station as defined in Claim 10, wherein the multi-element antenna is a dual element antenna.

13. (Original) A remote station as defined in Claim 10, wherein the controller further comprises at least two search engines, each search engine configured to receive in-phase and quadrature signals from an antenna element.

14. (Canceled)

15. (Original) A remote station as defined in Claim 10, wherein the controller further comprises a combiner configured to receive in-phase and quadrature signals from each antenna element and weighting factors from a weighting factor engine, and output an optimized in-phase and quadrature signal.

16. (Original) A remote station as defined in Claim 10, wherein the controller further comprises a demodulator configured to receive optimized in-phase and quadrature signals and output a demodulated signal.

17. (Original) A remote station as defined in Claim 10, wherein the received signals are CDMA signals.

18. (Currently Amended) A wireless communication system comprising:

at least one base station configured to transmit communication signals; and

at least one remote station configured to receive communication signals from the at least one base station with a multi-element antenna wherein the received signals are highly correlated and are combined to reproduce the signal from a selected one of the at least one base station and configured to determine a spatial signature, including

amplitude, angle of arrival and phase, for each signal and configured to estimate a complex covariance matrix, wherein the at least one remote station further comprises a controller configured to determine a spatial signature, including amplitude, angle of arrival and phase of each communication signal received from the at least one base station, to estimate a complex covariance matrix and to combine the correlated signals to reproduce the signal transmitted from a selected one of the at least one base station and wherein the controller further comprises a weighting factor engine configured to determine a set of weighting factors in response to the corresponding spatial signatures for each of the communication signals received and said complex covariance matrix, whereby said weighting factors may be determined in accordance with the following equation:

$w = ((R-Rs)^{-1})c$, where w is the weighting factor, c is an estimate of said complex spatial signature, R is said complex covariance matrix, and Rs is the matrix formed by taking the out-product of said c with c-hermitian conjugate.

19. (Original) A wireless communication system as defined in Claim 18, wherein the multi-element antenna is a dual element antenna.

20. (Original) A wireless communication system as defined in Claim 18, wherein the multi-element antenna has an envelope correlation of greater than about 0.7.

21. (Canceled)

22. (Canceled)

23. (Currently Amended) A wireless communication system as defined in Claim [[22]] 18, wherein the controller further comprises a combiner to combine the communication signals received using the weighting factors to reproduce the signal from a selected one of the at least one transmitter.

24. (Previously Presented) A wireless communication system as defined in Claim 23, wherein the communication signals are combined using an optimal combiner, wherein a signal to interference ratio is optimized.

25. (Previously Presented) A wireless communication system as defined in Claim 23, wherein the communication signals are combined using a maximal combiner, wherein a signal to interference ratio is maximized.

26. (Currently Amended) A wireless communication system as defined in Claim [[27]] 18, wherein the communication signals are CDMA signals.

27. (Currently Amended) A method of processing a multipath signal comprising:

receiving signals from at least one transmitter at multiple antennas;

estimating a complex covariance matrix;

identifying a preferred transmitter among the at least one transmitter, from which a desired signal was received;

producing a signal from each antenna such that the produced signals are highly correlated and contain signal components of a desired signal from the preferred transmitter, and interfering signals;

determining a spatial signature, including amplitude, angle of arrival and phase, for each signal; [[and]]

combining two or more of the highly correlated signals to maximize the ratio of the desired signal amplitude to the interfering signal amplitude;

determining a set of weighting factors for each received signal in response to the spatial signatures of the received signals and said complex covariance matrix, whereby said weighting factors may be determined in accordance with the following equation: $w = ((R\text{-}Rs)^{-1})c$, where w is the weighting factor, c is an estimate of said complex spatial signature, R is said complex covariance matrix, and Rs is the matrix formed by taking the out-product of said c with c-hermitian conjugate; and

reproducing a signal corresponding to the desired signals received from the preferred transmitter using the weighting factors.

28. (Canceled)

29. (Previously Presented) A method as defined in Claim 27, wherein the received signals are combined using an optimal combiner, wherein a signal to interference ratio is optimized.

30. (Previously Presented) A method as defined in Claim 27, wherein the received signals are combined using a maximal combiner, wherein a signal to interference ratio is maximized.

31. (Original) A method as defined in Claim 27, wherein the received signals are CDMA signals.

32. (Currently Amended) A method of processing a signal in a wireless communication system, the method comprising:

receiving a signal from multiple transmitters with a highly correlated multi-element antenna;

estimating a complex covariance matrix;

determining a spatial signature, including amplitude, angle of arrival and phase, of each signal received from the multiple transmitters;

determining a set of weighting factors for each transmitter signal in response to the spatial signatures of the received signals and said complex covariance matrix, whereby said weighting factors may be determined in accordance with the following equation:

$w = ((R-Rs)^{-1})c$, where w is the weighting factor, c is an estimate of said complex spatial signature, R is said complex covariance matrix, and Rs is the matrix formed by taking the out-product of said c with c-hermitian conjugate; and

combining the received signals using the weighting factors to reproduce the signal from a selected one of the multiple transmitters.

33. (Original) A method as defined in Claim 32, wherein the multi-element antenna is a dual element antenna.

34. (Original) A method as defined in Claim 32, wherein the multi-element antenna has an envelope correlation of greater than about 0.7.

35. (Previously Presented) A method as defined in Claim 32, wherein the received signals are combined using an optimal combiner, wherein a signal to interference ratio is optimized.

36. (Previously Presented) A method as defined in Claim 32, wherein the received signals are combined using a maximal combiner, wherein a signal to interference ratio is maximized.

37. (Original) A method as defined in Claim 32, wherein the received signals are CDMA signals.

38. (Currently Amended) A method of processing a signal in a wireless communication system, the method comprising:

means for receiving signals from at least one transmitter at multiple antennas;

means for estimating a complex covariance matrix;

means for identifying a preferred transmitter among the at least one transmitter, from which a desired signal was received;

means for producing a signal from each antenna such that the produced signals are highly correlated and contain signal components of a desired signal from the preferred transmitter, and interfering signals;

means for determining a spatial signature, including amplitude, angle of arrival and phase, for each signal;

means for determining a set of weighting factors for each received signal in response to the spatial signatures of the received signals and said complex covariance

matrix, whereby said weighting factors may be determined in accordance with the following equation:

$w = ((R-Rs)^{-1})c$, where w is the weighting factor, c is an estimate of said complex spatial signature, R is said complex covariance matrix, and Rs is the matrix formed by taking the out-product of said c with c-hermitian conjugate; and

means for combining two or more of the highly correlated signals to maximize the ratio of the desired signal amplitude to the interfering signal amplitude.

39. (Currently Amended) A wireless communication system comprising:

means for transmitting communication signals from at least one base station;

means for receiving communication signals by at least one remote station, the remote station configured to receive communication signals with a multi-element antenna wherein the received signals are highly correlated and are combined to reproduce the signal from a selected one of the at least one base station;

means for estimating a complex covariance matrix; [[and]]

means for determining a spatial signature, including amplitude, angle of arrival and phase, for each signal; and

means for determining a set of weighting factors for each received signal in response to the spatial signatures of the received signals and said complex covariance matrix, whereby said weighting factors may be determined in accordance with the following equation:

$w = ((R-Rs)^{-1})c$, where w is the weighting factor, c is an estimate of said complex spatial signature, R is said complex covariance matrix, and Rs is the matrix formed by taking the out-product of said c with c-hermitian conjugate.